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(54) **Filament, comprising smoke-modifying agent, in smoking article**

(57) A smoking article comprising a rod of smoking material includes at least one filament which is of accurately formed, preferably constant, cross section and extends over at least a major portion of the length of the rod, which filament comprises a smoke-modifying agent. The filament may carry or itself consist of one or more smoke-modifying agents. The material of the filament may be such that it is consumed in the combustion process or becomes frangible under the action of the heat

of combustion of the smoking material. In a method of producing such a smoking-material rod, smoking material, a filament of accurately formed cross section and comprising a smoke-modifying agent, and a wrapper web are fed continuously to the rod-forming device of a rod-making machine so that a wrapped rod incorporating the filament is formed. The smoke-modifying agent may be applied to the filament before it enters the rod-forming device by passing it over part, immersed in a quantity of the said agent, of a rotating member. The quantity applied may be constant or increased at regular intervals along the filament.

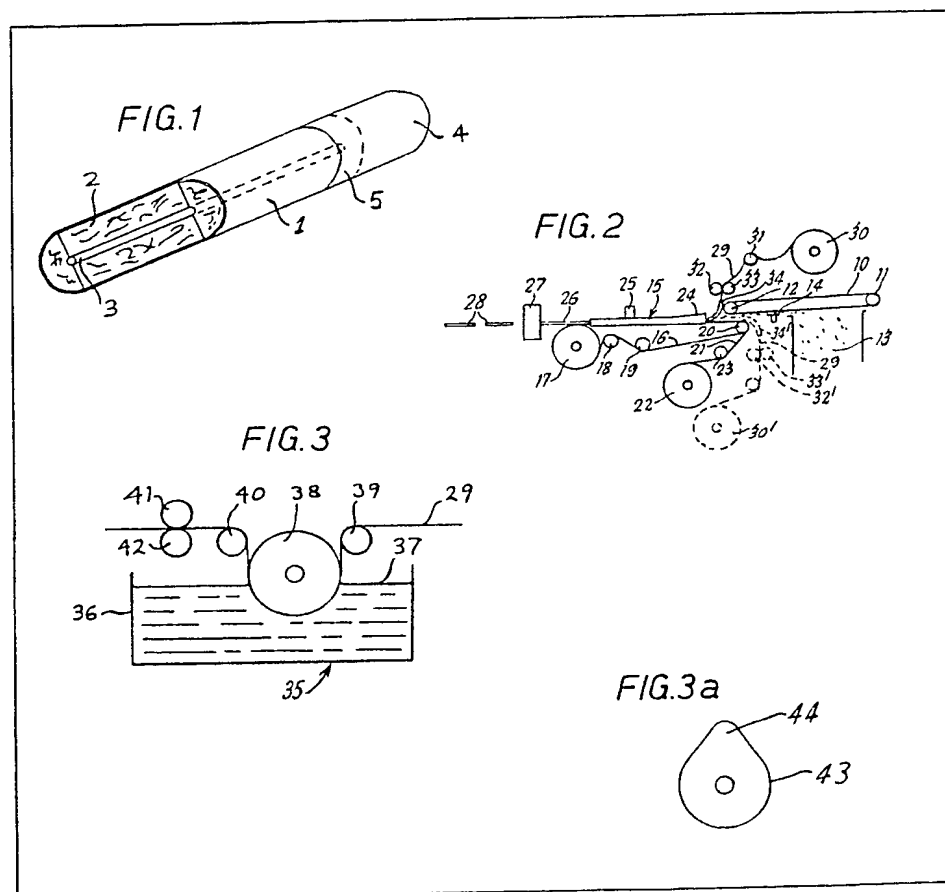


FIG. 1

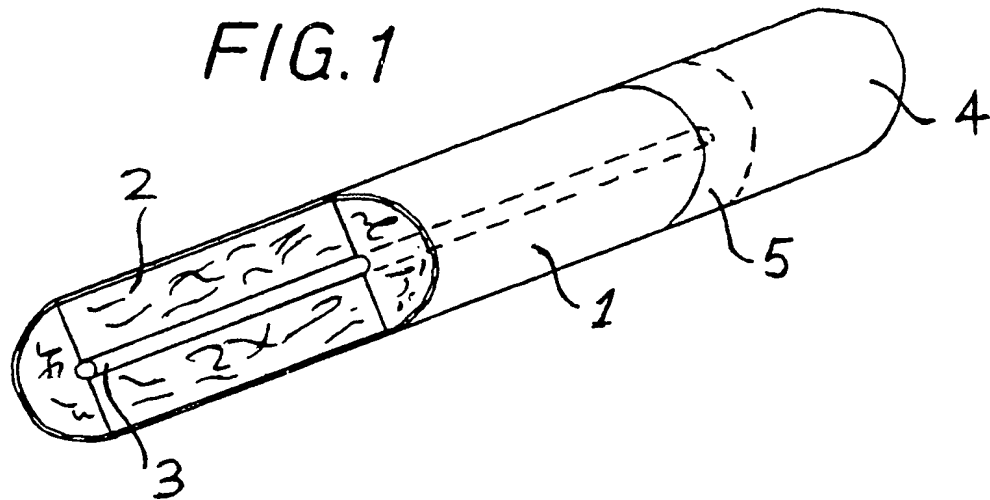


FIG. 2

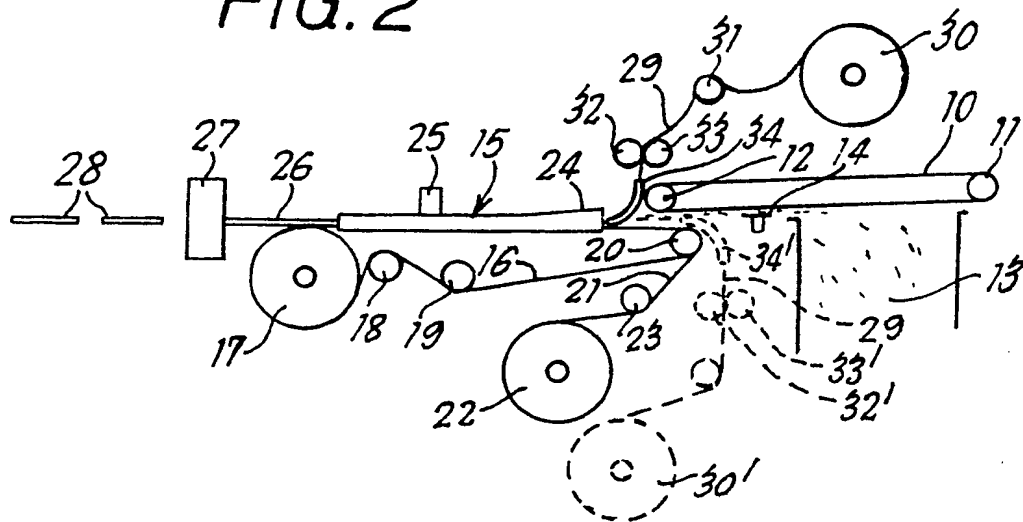


FIG. 3

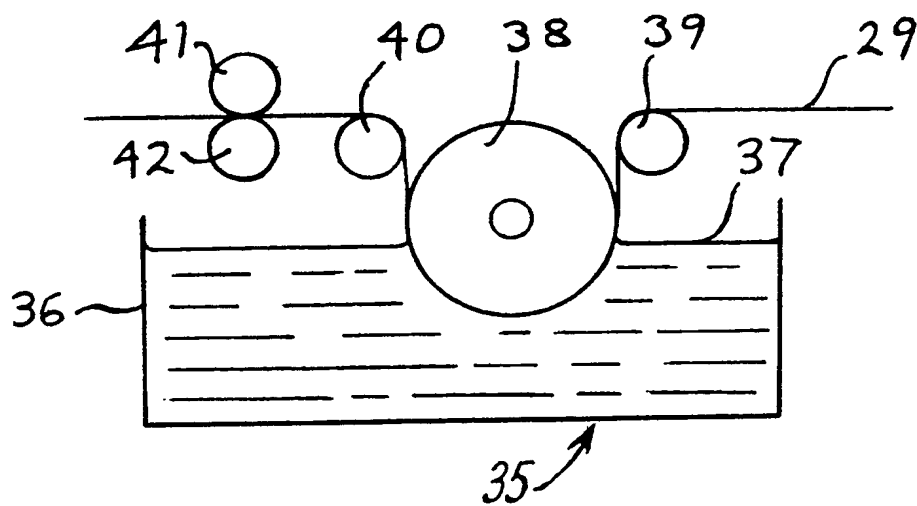


FIG. 3a

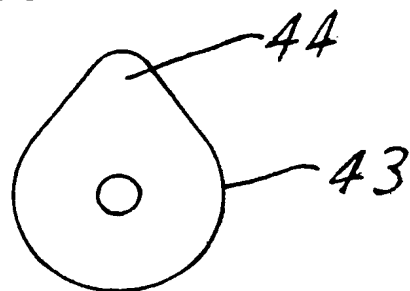








FIG. 4

Test No.	Flavourant	Filament Disposition	
1	A		
2	B		
3	C		
4	B		
5	A		

SPECIFICATION

Improvements relating to smoking articles

This invention relates to smoking articles incorporating smoke-modifying agents.

5 It is known to apply to smoking materials, tobacco or reconstituted tobacco for example, smoke-modifying agents for the purpose of, for instance, imparting a desired flavour to the smoke or for affecting the combustion process. For the purpose of applying a flavouring substance to tobacco, it is common to dissolve the substance in a volatile vehicle. In such a case it may be necessary to allow the treated tobacco to stand for a period of one to three or more days to permit equilibrium, that is to permit the volatile vehicle to be wholly removed from the tobacco and/or the establishment, by migration, of an even distribution of the flavouring substance throughout the tobacco. It is an object of the present invention to provide simple, practical, means whereby a smoke-modifying agent can be effectively incorporated in a smoking-material rod of a smoking article, a cigarette for example, at an accurate predetermined loading without the necessity for an equilibration period.

Some smoke-modifying agents are of a non-volatile character and may, for example, be precursors of flavourant substances, which substances are released into the smoking material and/or the smoke under the action of the heat of the combustion process. Other non-volatile smoke-modifying agents may be intended to react with the combustion products to produce a modified smoke. Since the temperature in the combustion zone varies from the axis to the periphery of the rod, the action of such heat-activated agents will also vary according to their position in the smoking-material rod. It is a further object of the present invention to provide means whereby smoke-modifying agents can be incorporated at a desired transverse position in smoking-material rods.

Smoking articles comprising a carbonised-rod core circumscribed by tobacco shreds and a wrapper are disclosed in United Kingdom Patent Specification No. 2,045,594A. The diameter of the carbonised rod should, it is said, be greater than about 3 mm in order to ensure that the rod structure had adequate physical strength to facilitate subsequent fabrication into smoking articles. It is furthermore stated that the ratio of the diameter of the carbon core to the diameter of the smoking article should be between 0.30 and 0.75".

55 It is known from United States Patent Specification No. 2,072,361 to insert into a wrapped tobacco rod of a cigarette a reed stick formed with a pointed end and obtained from a tropical plant. Batches of such reed sticks are first impregnated with flavouring substances by being enclosed in a chamber and subjected therein to an atmosphere of steam, under pressure, containing the flavouring substances. After being impregnated in this manner, the reed sticks are

65 cooled and to each is applied a coating of a sealant material.

In United States Patent Specification No. 3,162,199, there is described a method of incorporating in a cigarette rod, as the same is manufactured in a rod-making machine, elongate capsules containing flavourants or other additives. When cigarettes comprising sections of such tobacco rod are smoked, the heat of the combustion process degrades the walls of the capsules, thus permitting the substance contained therein to be released and to be entrained, as vapour, in the smoke.

United Kingdom Patent Specification No. 1,083,761 discloses an inhaling and smoking device comprising an open-ended tube, surrounded by tobacco, within which tube a flavourant material is deposited.

The present invention provides a smoking article comprising a smoking-material rod including a filament of accurately formed, preferably constant, cross section extending over at least a major portion of the length of said rod, said filament comprising a smoke-modifying agent.

90 The invention further provides a method of producing a smoking-material rod, wherein smoking material, a filament of accurately formed, preferably constant, cross section, and a wrapper web are fed continuously to the rod-forming device, suitably a garniture, of a rod-making machine, so that wrapped rod incorporating said filament is formed.

By a "filament" in this Specification and the appended claims is to be understood a slender flexible thread-like body of a cross-sectional area which is not more than 2%, and preferably not more than 1%, of the cross-sectional area of the smoking-material rod, that is, for a cigarette having a diameter within the normal range, a mean filament diameter of not more than 1.5 mm and preferably not more than 0.7 mm. The flexibility of the filament should be such as to afford an acceptable degree of reliability as well as to withstand operations which the filament will undergo in the course of incorporation in the smoking-material rod. Preferably the filament is not breakable merely by being bent.

110 Preferably the filament is co-extensive, longitudinally, with the smoking-material rod. The filament may have a cross section other than circular and may, for example, be flattened or have an indented periphery.

By use of the present invention, a smoke-modifying agent can be added to a cigarette or other smoking article at an accurate loading level without any or any substantial alteration of the physical structure of the smoking-material rod. There is no necessity for a reduction in the weight of smoking material in the rod. Also the physical structure of the rod of smoking material is substantially unaffected by the presence therein of said filament. Furthermore the method of the invention is consistent with current high-speed cigarette manufacturing techniques and can be

practised conveniently and inexpensively.

The filament may be formed of any material which is susceptible of being formed into a filament having an accurately formed cross section, will readily carry or can be readily

impregnated with the smoke-modifying agent concerned and can be knocked away with the accompanying smoking-material ash as the article is smoked. To fulfil the last mentioned requirement the filament may be of such constitution that it is consumed in the combustion process, or it may be frangible or become frangible under the action of the heat of the combustion of the smoking material. Thus the filament may suitably be formed of or obtained from a fibrous material, for example tobacco, paper, cotton, or man-made textile fibres, those of rayon for instance. If it is required that the loading of smoke-modifying agent per unit length of the filament is constant, then it is important that the filament is formed with accurately constant cross section and with accurately constant constitution.

Suitable as smoke-modifying agents are flavours including, for example, menthol, sugars, amino acids, cocoa, liquorice, a carob-bean extract and pyrazines. Nicotine-source material or metals or metal salts may also be employed as modifying agents. A carbonate may be used for the purpose of raising the pH value of the smoke, or a chloride may be used in order to modify the smoke by varying the burn rate of the smoking-material rod. The smoke-modifying agent may also take the form of a humectant. As will be appreciated by those skilled in the art, it may be convenient to apply many smoke-modifying agents by first dissolving them in an appropriate vehicle. More than one smoke-modifying agent may be incorporated in or on a filament.

If required, more than one filament may be incorporated within the smoking-material rod. Thus, for example, one filament of small-diameter circular cross section may be disposed axially of the rod and/or or more filaments of circular, flat or other cross section may be disposed in a peripheral region of the rod. If a plurality of filaments are employed, one such filament may comprise a smoke-modifying agent different from that of the other filament or filaments, in which case the filaments may be formed of differing materials.

As an alternative to the incorporation of a smoke-modifying agent in a filament by treating the filament with the agent, by spraying or immersion for instance, the agent may be incorporated in the material of the filament prior to the filament-forming process. Indeed, the filament may be wholly comprised of one or more smoke-modifying agents.

In order that the invention may be clearly understood and readily carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:—

Figure 1 shows a perspective view, partly cut away, of a cigarette;

Figure 2 shows a diagrammatic elevation of a cigarette rod-making machine;

Figure 3 shows applicator means which may be used in association with the machine of Figure 2;

Figure 3a depicts a modification of the applicator means of Figure 3; and

Figure 4 is a table relating to tests with various filament dispositions.

The cigarette shown in Figure 1 comprises a paper wrapper 1 which enwraps a rod of cut tobacco 2. Disposed axially of the tobacco rod 2 and extending over its full length is a filament 3 of circular cross section. Prior to being incorporated in the tobacco rod 2, the filament 3 was impregnated with a tobacco-smoke flavourant, carob bean extract for example. The filament 3 may be composed of, for example, reconstituted tobacco, which may be formed by an extrusion process as described in United Kingdom Patent Specification No. 983,928. The cigarette of Figure 1 further comprises a filter tip section 4 attached to the tobacco rod 2 by tipping 5.

A filament, comprising a smoke-modifying agent, may be incorporated in a smoke-material rod by use of a cigarette rod-making machine as shown in Figure 2. The machine comprises an endless suction band 10 trained about rollers 11, 12 one of which is rotatable by drive means (not shown). Tobacco is induced by suction means (also not shown) to travel up a chimney 13 and to be desposited as a layer on the under surface of the lower run of the suction band 10. The layer of tobacco on the band 10 moves to the left, in Figure 2, and is trimmed to the desired depth in known manner by means of a pair of ecriteur discs only one of which, designated 14, is shown in Figure 2.

As is known to those skilled in the cigarette manufacturing industry, in operation of the rod-making machine, the layer of trimmed tobacco is transferred from the band 10 to the entry end of a garniture, generally designated 15. The garniture 15 includes an endless garniture tape 16 trained about a drive pulley 17 (driven by means not shown) and pulleys 18, 19 and 20. A cigarette paper web 21, supplied from a bobbin 22, is fed over a guide pulley 23 and on to the entry end of the upper run of the garniture tape 16.

In operation of the rod-making machine to produce orthodox cigarette rod, the tobacco and the paper web 21 enter a tongue 24 of the garniture 15 in which is initiated a process whereby the paper web 21 is wrapped about the tobacco to produce a wrapped rod of circular cross section. At an intermediate stage of this process in the garniture 15, adhesive is applied by means of an applicator 25 to an edge portion of the paper web 21, which adhesive serves to form a lap seam in known manner. Formed rod 26 passes from the garniture 15 to a cutting device 27 operable to cut the rod into desired discrete lengths 28.

The machine of Figure 2 is simply modified as follows for causing a filament to be incorporated in the formed rod: A continuous filament 29 of accurately constant cross section and previously

treated with a smoke-modifying agent is fed from a bobbin 30 from which it passes over a pulley 31 and between a pair of pulleys 32, 33 to an insertion guide 34 in the form of a thin-walled curved tube the exit end of which is directed at the entry end of the tongue 24. The bobbin 30 and the pulleys 31, 32 and 33 are driven (by means not shown) so that the filament 29 is fed via the guide 34 into the garniture 15 without being subjected to unacceptable tensile forces.

Instead of feeding the filament 29 from above, it may be fed from below from a bobbin 30' (indicated by broken lines) via pulleys 32', 33' to an insertion guide 34' the exit end of which is situated intermediate the overlapping portions of the suction band 10 and the garniture tape 16.

For the manufacturing process as just described it is assumed that the filament 29 has been previously treated with the flavourant or other modifying agent. If required, however, the agent could be applied to the filament 29 after it has been withdrawn from the bobbin 30 (30') and before its entry into the garniture 15. For this purpose the applicator depicted in Figure 3 could be used. The applicator, designated generally 35, comprises a bath 36 in which is held a quantity 37 of the agent, for example carob bean extract in an ethanol vehicle. The applicator 35 further comprises an applicator wheel 38 so mounted relative to the bath 36 that a lower portion of the wheel 38 is immersed in the quantity 37 of modifying agent, which is maintained at a constant depth by known supply-control means (not shown). To each side of the roller are mounted a pair of rollers 41, 42 one or both of which rollers is or are provided with an elastomeric peripheral surface. The applicator wheel 38 and the rollers 39—42 are drivable by drive means (not shown). In operation of the applicator 35, the filament 29 travels in contact with that portion of the periphery of the wheel 38 which is immersed in the quantity 37 of the agent. The filament 29 then passes from the wheel 38 and over the pulley 40 to the rollers 41, 42. As the filament 29 passes through the nip of the rollers 41, 42, surplus liquid is removed and is returned to the bath 36. This, together with the constant cross section of the filament 29, ensures a constant application of agent per unit length of the filament.

The applicator 35 may be modified, if required, so that at regular intervals along the filament 29 the application of agent is at a higher level. Thus for example the wheel 38 may be replaced by the applicator wheel 43 of Figure 3a. Wheel 43 is of a "cam" form and comprises a nose part 44 which extends the periphery of the wheel further from the axis thereof than the constant radius of the remainder of the wheel. During each revolution of the wheel 43, the nose part 44 passes through the quantity 37 of agent in the bath 36 and when this occurs the path of the filament 29 through the agent, and thus the time of immersion therein of a portion of the length of the filament, is extended. More agent is absorbed in each of these, equally

spaced, portions of the filament 29 than in the intervening lengths thereof and, even after the filament has passed between the rollers 41, 42, the concentration of agent in these portions will be at an enhanced level. In the subsequent rod-making process, the formed rods are suitably cut at the mid-point of these portions of enhanced concentration, the arrangement being such that the distance between one such mid-point and a next adjacent midpoint is equivalent to the length of two cigarette rods. In the finished cigarettes, the portions of the filament 29 carrying the enhanced concentration of agent will be at that end of the tobacco rod intended to be lit.

In order to assess the efficacy of the above-described mode of incorporating smoke-modifying agents in cigarette tobacco rods, a number of tests were run with different filament dispositions. As smoke-modifying agents, three liquid organic flavourants were selected. The first, designated A, was a flavourant formulated to be compatible with American-style blends of tobacco; the second, B, was a flavourant formulated to be compatible with a blend of flue-cured tobacco; and the third, C, was a flavourant formulated to have the character of flue-cured tobacco. The filament selected was an accurately formed cotton thread of 0.5mm constant diameter. The cigarettes concerned had a tobacco rod of flue-cured tobacco and a cellulose acetate filter. Details of the tests are shown in the Table represented in Fig. 4.

Cigarettes provided with filaments as indicated in the Table were smoked and the character of the smoke was compared with that of cigarettes in which the flavourants A, B and C had been incorporated by orthodox means not involving the use of filaments. It was found that the flavours incorporated in the cigarettes by filaments had produced an enhancement of the character of the smoke of at least the same amplitude as when the flavours were incorporated in the orthodox manner. No effects detrimental to enjoyable smoking of the cigarettes provided with the filaments were observed.

CLAIMS

1. A smoking article comprising a rod of smoking material including at least one filament which is of accurately formed cross section and extends over at least a major portion of the length of the said rod, which filament comprises a smoke-modifying agent, the physical structure of the rod of smoking material being substantially unaffected by the presence therein of said filament.

2. An article according to claim 1, wherein the filament is of constant cross section.

3. An article according to claim 1 or 2, wherein the filament carries or is impregnated with one or more smoke-modifying agents.

4. An article according to claim 1 or 2, wherein the filament consists of one or more smoke-modifying agents.

5. An article according to any one of the preceding claims, wherein the material of the

filament is of such constitution that it is consumed in the combustion process.

6. An article according to any one of claims 1 to 4, wherein the material of the rod is of such constitution that it becomes frangible under the action of the heat of combustion of the smoking material.

7. An article according to any one of the preceding claims, wherein one or more said filaments are located substantially axially in the smoking-material rod.

8. An article according to any one of the preceding claims, wherein one or more said filaments are located in a peripheral region of the smoking-material rod.

9. A smoking article substantially as hereinbefore described with reference to the accompanying drawings.

10. A method of producing a smoking-material rod, wherein smoking material, a filament of accurately formed cross section and comprising a smoke-modifying agent, and a wrapper web are fed continuously to the rod-forming device of a rod-making machine so that a wrapped rod incorporating said filament is formed, the physical

structure of the rod of smoking material being substantially unaffected by the presence therein of said filament.

11. A method according to claim 10, wherein the rod-forming device is a garniture and the filament is introduced into the garniture by way of a tubular guide disposed to deliver the said filament into the smoking material entering the garniture with the garniture tape and the wrapper web.

12. A method according to claim 10 or 11, wherein the smoke-modifying agent is applied to the filament before it enters the said rod-forming device by passing the filament over part, immersed in a quantity of the said agent, of a rotating member.

13. A method according to claim 12, wherein the quantity of the said agent applied to parts of the filament at regular intervals along the said filament is increased by shaping the rotating member for extending the period of immersion of the said parts of the filament.

14. A method for producing a smoking-material rod with a filament comprising a smoke-modifying agent substantially as hereinbefore described.